

WHAT IS CLAIMED IS:

1. A rear projection display device comprising a light source lamp, color
splitting means for splitting light emitted from the light source lamp into a
5 plurality of color components, a plurality of liquid crystal panels for optically
modulating each color light split by the color splitting means, color
synthesizing means for synthesizing each of the color light modulated by the
liquid crystal panels, and projection means for projecting image light which is
color-synthesized by the color synthesizing means on a screen from slantly
10 above or from slantly below,

wherein a polarization direction of at least one color component out of the
image light irradiated on the screen is parallel to a vertical cross section of
the screen.

15 2. The rear projection display device according to claim 1,

wherein the screen is rectangular, and the vertical cross section of the
screen is a y-z plane when the width direction of the screen is taken along an
x-axis, the height direction of the screen is taken along a y-axis, and the
vertical direction to the screen is taken along a z-axis.

20 3. ~~The rear projection display device according to claim 1,~~
~~wherein at least one of the color components is green.~~

4. The rear projection display device according to claim 3,

25 wherein polarization direction adjusting means is provided for adjusting a

polarization direction of at least the green component out of the image light synthesized by the color synthesizing means so that the polarization direction of at least the green component is parallel to the vertical cross section of the screen.

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5. The rear projection display device according to claim 4,

wherein the polarization direction adjusting means comprises a retardation plate.

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6. The rear projection display device according to claim 1,

wherein polarization directions of all the color components of the image light irradiated on the screen are parallel to the vertical cross section of the screen.

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7. The rear projection display device according to claim 6,

wherein polarization direction adjusting means is provided for selectively adjusting a color component, of which a polarization direction is orthogonal with the vertical cross section of the screen, out of the image light synthesized by the color synthesizing means so that the polarization direction of the color component is parallel to the vertical cross section of the screen.

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8. The rear projection display device according to claim 7,

wherein the polarization direction adjusting means comprises a retardation plate.

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9. The rear projection display device according to claim 1,
wherein the projection means includes a plurality of aspherical mirrors
functioning as a lens.

5 10. The rear projection display device according to claim 1,
wherein the relation $i\text{-min} < \alpha < i\text{-max}$ is satisfied, where an angle of a
maximum value $i\text{-max}$ and a minimum value $i\text{-min}$ is formed by a normal of a
back surface of the screen and a principal ray of the image light irradiated on
the back surface of the screen, and an angle α is obtained when the
10 reflectivity of light, having a polarization direction parallel to the vertical
cross section of the screen, to the back surface of the screen is minimum.

11. The rear projection display device according to claim 1,
wherein the relation $j\text{-min} < \beta < j\text{-max}$ is satisfied, where an angle of a
maximum value $j\text{-max}$ and a minimum value $j\text{-min}$ is formed by a normal of a
front surface of the screen and a principal ray of the image light irradiated on
the front surface of the screen, and an angle β is obtained when the
reflectivity of light, having a polarization direction parallel to the vertical
cross section of the screen, to the front surface of the screen is minimum.

12. The rear projection display device according to claim 11,
wherein the screen includes a fresnel lens and the front surface of the
screen is an inclined surface with a ring body shaped protrusion of the
fresnel lens.

13. The rear projection display device according to claim 10,

wherein the polarization direction of at least the green component out of the image light irradiated on the screen is parallel to the vertical cross section of the screen.

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14. A rear projection display device comprising a light source lamp, color splitting means for splitting light emitted from the light source lamp into a plurality of color components, a plurality of liquid crystal panels for optically modulating each color light split by the color splitting means, color synthesizing means for synthesizing each of the color light modulated by the liquid crystal panels, and projection means for projecting image light which is color-synthesized by the color synthesizing means on a screen from a slant side,

wherein a polarization direction of at least one color component out of the image light irradiated on the screen is parallel to a horizontal cross section of the screen.

15. The rear projection display device according to claim 14,

wherein the screen is rectangular, and the horizontal cross section of the screen is an x-z plane when the width direction of the screen is taken along an x-axis, the height direction of the screen is taken along a y-axis, and the vertical direction to the screen is taken along a z-axis.

16. The rear projection display device according to claim 14,

wherein at least one of the color components is green.

17. The rear projection display device according to claim 16,

wherein polarization direction adjusting means is provided for adjusting a polarization direction of at least the green component out of the image light irradiated on the screen so that the polarization direction of at least the green component is parallel to the horizontal cross section of the screen.

18. The rear projection display device according to claim 17,

wherein the polarization direction adjusting means comprises a retardation plate.

19. The rear projection display device according to claim 14,

wherein polarization directions of all the color components of the image light irradiated on the screen are parallel to the horizontal cross section of the screen.

20. The rear projection display device according to claim 19,

wherein polarization direction adjusting means is provided for selectively adjusting a color component, of which polarization direction is orthogonal with the horizontal cross section of the screen, out of the image light synthesized by the color synthesizing means so that the polarization direction of the color component is parallel to the horizontal cross section of the screen.

21. The rear projection display device according to claim 20,

wherein the polarization direction adjusting means comprises a retardation plate.

22. The rear projection display device according to claim 14,

5 wherein the projection means includes a plurality of aspherical mirrors functioning as a lens.

23. The rear projection display device according to claim 14,

10 wherein the relation $i\text{-min} < \alpha < i\text{-max}$ is satisfied, where an angle of a maximum value $i\text{-max}$ and a minimum value $i\text{-min}$ is formed by a normal of a back surface of the screen and a principal ray of the image light irradiated on the back surface of the screen, and an angle α is obtained when the reflectivity of light, having a polarization direction parallel to the horizontal cross section of the screen, to the back surface of the screen is minimum.

15 24. The rear projection display device according to claim 14,

20 wherein the relation $j\text{-min} < \beta < j\text{-max}$ is satisfied, where an angle of a maximum value $j\text{-max}$ and a minimum value $j\text{-min}$ is formed by a normal of a front surface of the screen and a principal ray of the image light irradiated on the front surface of the screen, and an angle β is obtained when the reflectivity of light, having a polarization direction parallel to the horizontal cross section of the screen, to a front surface of the screen is minimum.

25 25. The rear projection display device according to claim 24,

wherein the screen includes a fresnel lens and the front surface of the

screen is an inclined surface with a ring body shaped protrusion of the fresnel lens.

26. The rear projection display device according to claim 23,

5 wherein the polarization direction of at least the green component out of the image light irradiated on the screen is parallel to the horizontal cross section of the screen.

27. A rear projection display device comprising a light source lamp, color
10 splitting means for splitting light emitted from the light source lamp into a plurality of color components, a plurality of liquid crystal panels for optically modulating each color light split by the color splitting means, color synthesizing means for synthesizing each of the color light modulated by the liquid crystal panels, and projection means for slantly projecting image light
15 which is color-synthesized by the color synthesizing means on a screen,

wherein a polarization direction of at least one color component out of the image light irradiated on the screen is parallel to a plane including the image light irradiated on the screen and a normal of the screen.

20 28. The rear projection display device according to claim 27,

wherein at least one of the color components is green.

29. The rear projection display device according to claim 28,

wherein polarization direction adjusting means is provided for adjusting a
25 polarization direction of at least the green component out of the image light

irradiated on the screen so that the polarization direction of at least the green component is parallel to the plane including the image light irradiated on the screen and the normal of the screen.

5 30. The rear projection display device according to claim 29,
wherein the polarization direction adjusting means comprises a retardation plate.

31. The rear projection display device according to claim 27,
10 wherein polarization directions of all the color components of the image light irradiated on the screen are parallel to the plane including the image light irradiated on the screen and the normal of the screen.

32. The rear projection display device according to claim 31,
15 wherein polarization direction adjusting means is provided for selectively adjusting a color component, of which a polarization direction is orthogonal with the plane including the image light irradiated on the screen and the normal of the screen, out of the image light synthesized by the color synthesizing means so that the polarization direction of the color component
20 is parallel to the plane.

33. The rear projection display device according to claim 32,
wherein the polarization direction adjusting means comprises a retardation plate.

34. The rear projection display device according to claim 27,

wherein the projection means includes a plurality of aspherical mirrors functioning as a lens.

5 35. The rear projection display device according to claim 27,

wherein the relation $i\text{-min} < \alpha < i\text{-max}$ is satisfied, where an angle of a maximum value $i\text{-max}$ and a minimum value $i\text{-min}$ is formed by a normal of a back surface of the screen and a principal ray of the image light irradiated on the back surface of the screen, and an angle α is obtained when the reflectivity of light, having a polarization direction parallel to the plane including the image light irradiated on the back surface of the screen and the normal of the back surface of the screen, to the back surface of the screen is minimum.

10 36. The rear projection display device according to claim 27,

wherein the relation $j\text{-min} < \beta < j\text{-max}$ is satisfied, where an angle of a maximum value $j\text{-max}$ and a minimum value $j\text{-min}$ is formed by a normal of a front surface of the screen and a principal ray of the image light irradiated on the front surface of the screen, and an angle β is obtained when the reflectivity of light, having a polarization direction parallel to the plane including the image light irradiated on the front surface of the screen and the normal of the front surface of the screen, to the front surface of the screen is minimum.

25 37. The rear projection display device according to claim 36,

wherein the screen includes a fresnel lens and the front surface of the screen is an inclined surface with a ring body shaped protrusion of the fresnel lens.

5 38. The rear projection display device according to claim 27,

wherein the polarization direction of at least the green component out of the image light irradiated on the screen is parallel to the plane including the image light irradiated on the back surface of the screen and the normal of the back surface of the screen.

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